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ABSTRACT

This publication presents a series of five papers based on presentations given at a rural development symposium dealing with the role of education in off-farm employment and rural economic development. The first paper, "Education and Rural Economic Development" (Thomas G. Johnson), discusses linkages between the regional educational attainment levels and the potential for rural economic growth. Paper 2, "Investing in Government Public Services: Is it Necessary for Rural Development?" (Rodney L. Clouser), proposes specific investments by state, local, and federal governments for rural development. Paper 3, "The First Job Decision and the Probability of Off-Farm Work" (Judith I. Stallmann and James H. Nelson), reports the results of a survey related to first job decisions by farm operators and their probable consequences. The fourth paper, "Education and Economic Development in Rural Appalachia" (Thomas G. Johnson and David E. Broomhall), identifies factors that influence decisions made by high school students to obtain additional education, with a focus on the behavior of high school students in rural Appalachia. The final paper, "Human Capital, Transactions Costs and Farm Labor Supply and Demand: Some Implications for Rural Economic Development" (Stephan J. Goetz), presents an economic model of farmers' joint decision to obtain off-farm employment and to hire farm workers. This document contains numerous charts and graphs. (LP)

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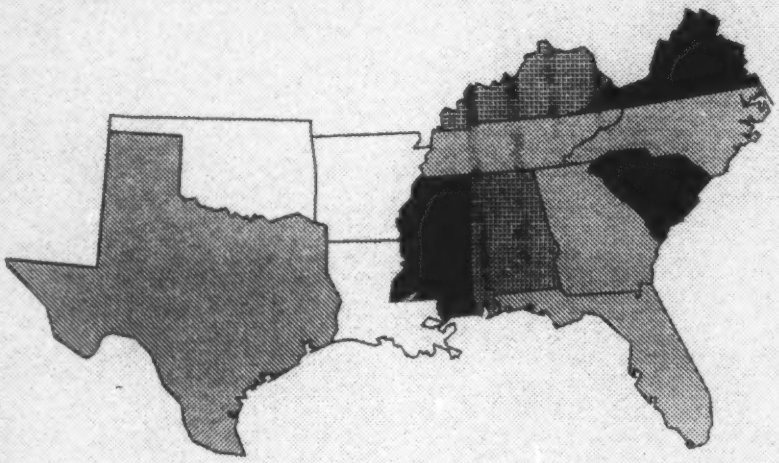
Education, Off-Farm Employment and Rural Economic Development:

Perspectives from States in the Southeast



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Education, Off-Farm Employment and Rural Economic Development:

Perspectives from States in the Southeast

edited by

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University of Kentucky
Department of Agricultural Economics

**Proceedings of a Rural Development Symposium
at the 1992 meetings of the
Southern Agricultural Economics Association**

**Published by the
Southern Rural Development Center**

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Introduction

David L. Debertin*

This publication presents a series of papers dealing with the role of education in off-farm employment and rural economic development. The papers are largely based on presentations by the authors at an organized symposium held at the meeting of the Southern Agricultural Economics Association held in Lexington, Kentucky in February of 1992.

In many states in the South, part-time off-farm jobs are providing an increasing share of total income for farm residents. Increasingly, farm residents are taking on full-time jobs and farming on the side. Many people prefer farm life, but lack sufficient capital to rely on farming as the sole source of income. These individuals need not make a large investment in order to live on a farm, since farm income is only part of total income. Moreover, the off-farm job provides important year-to-year income stability which might not occur if reliance was placed entirely on income from the farm.

The additional income attained by working part-time or even full-time off-farm is important for farmers. However, if farmers are to be able to do this, there are two important prerequisites. First, the off-farm employment opportunities must exist. In other words, industrial and other economic growth must have taken place if off-farm employment is to be a viable option. Second, the farmers and their spouses who seek off-farm employment must have the requisite education or other specific job skills needed by the employer.

Most rural development specialists tend to think primarily about the problems associated with attracting firms that will generate job growth in rural areas. What does the local community need to do in order to encourage a firm to locate in a particular area? A lack of education among farm residents is an important problem in many rural areas of the South. In Kentucky, for example, those employed in farming tend to be less educated, on average, than the state's population as a whole. Firms that are interested in recruiting a well-educated workforce are therefore reluctant to locate in many rural areas, not only in Kentucky, but in other rural areas in the South where average educational levels tend to be low. Often only the more highly educated farmers and their spouses are able to find part-time or full-time off-farm employment while continuing to live on a farm and obtain additional income from farming activities.

In the first paper, Johnson discusses some of the important linkages that exist between the educational level of people within a region and its potential for rural economic development. He argues that rural areas are disadvantaged by sparse population, large distances to major markets for products, poor educational systems, a high incidence of poverty and outmigration. He argues that much of the future potential for rural development is conditional on building a stronger and more viable educational base within rural regions.

Clouser indicates that specific investments by state, local and federal governments are needed if rural development is to take place. He provides statistical evidence to support the contention that many southern states lag behind the rest of the nation in their expenditures on public services. While this is true for education, it also appears to be true for many other public investments that would lead to rural infrastructure development. He believes that, in general, many southern states are significantly

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underinvesting in human capital. Because of this, employment opportunities for many rural residents in the South are more limited.

Stallmann and Nelson report the results of a survey and statistical analysis they conducted relating to first job decisions by farm operators and their probable consequences. They find that the age of the worker and the amount of vocational training significantly affect the decision to work off-farm. They argue that in some instances, workers may engage in farm labor when opportunities for off-farm employment is weak. This movement back to farm employment may occur more frequently during periods of weak economic growth.

Johnson and Broomhall identify factors that influence decisions by high school students to obtain additional education, with a particular emphasis on the behavior of high school students in rural appalachia. They conclude that to improve educational performance and break the cycle of poverty, it may be necessary to improve the socioeconomic conditions in the home. They argue that a variety of local factors influence academic performance, which, in turn, can have a profound effect on the future productivity of the local labor force. They stress that development efforts should pay increased attention to improving the local quality of life through improved public services, reducing the outflow of productive workers to the cities, and perhaps luring migrants back to rural areas.

Goetz presents an economic model of farmers' joint decision to obtain off-farm employment and to hire farm workers. He argues that transactions costs impose a significant barrier to many farmers when seeking off-farm employment and when hiring workers. Similarly, long-term unemployed potential workers in many urban centers face significant transactions costs and other disincentives when considering whether or not to be employed in short-term farm work. In many states in the South, the availability of hired workers to perform work at certain times during the production season is posing increasingly important limits to agricultural production. Reduction in transactions costs facing farmers both as on-farm employers of non-farm residents and as employees in off-farm jobs could contribute significantly to greater economic activity in many rural areas of the South.

Education and Rural Economic Development

Thomas G. Johnson*

Introduction

Theodore Schultz (1961) and other researchers (Becker for example) have shown strong links between human capital, especially education, and historical aggregate income growth. In fact, Schultz found the rate of return on investment in education to be higher than for many other types of investment. He estimated that between 30 and 50 percent of the historical increases in national income in the U.S. could be attributed to education. More recent studies, using more refined measures of educational investment, have found somewhat lower but still strong rates of return to education. Deaton and McNamara, upon reviewing literature in the area, conclude that there is little doubt that aggregate income is highly dependent on education.

Today's concern at the national level is with global competitiveness. Policy debate rages over whether our perceived loss of competitiveness should be attributed to declining work ethic, our massive government deficit, over regulation of the economy, crumbling infrastructure, lagging research and development expenditures, or a failure of our educational system. Schultz's conclusion, if still valid, would suggest that we must invest more in human capital, especially education.

However, two questions related to this conclusion must be raised. First, has (or will) the apparent restructuring of the world economy changed the role of education in economic growth? How should we educate ourselves to compete most effectively in this new environment? Second, what are the consequences of this conclusion and the answer to the first question, for rural communities?

The Future Role of Education in Economic Development

Robert Reich in his recent book, *The Work of Nations: Preparing Ourselves for 21st Century Capitalism*, deals with the impact of the emerging world economy on the demand for and supply of labor and the consequences for national economic growth. He states,

> *That the strength of the American economy is synonymous with the profitability and productivity of American corporations is. . . an axiom on the brink of anachronism (p. 135).*

He continues,

> *. . .the important question is not which nation's citizens own what, but which nation's citizens learn how to do what. . . (p. 137).*

Reich's clarification of this latter point indicates that it is something of an exaggeration. He says, for example, that investment is important and that the total return to the American economy depends not only on the total amount that Americans invest (worldwide) but also on the "care and wisdom with which such worldwide portfolios of investments have been compiled" (p. 139). This care and wisdom, it turns out, is an important, learnable skill.

> *Because the high-value enterprise is based on insights, the highest returns and the greatest leverage belong to skilled people. . . rather than to shareholders or executives occupying formal positions of authority (p. 148).*

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This perceived importance of skills is supported by recent research on industrial demand for skills (Teixeira and Swaim). Reich states later that,

> *New information quickly becomes part of worldwide webs. What remains behind are the skills and insights necessary to invent (p. 152) . . .Money, plants, information, and equipment are footloose, along with corporate logos. Brains, however, are far less mobile" (p. 163).*

While brains may be quite immobile from Reich's national vantage, it is important to note that they are very mobile from the community's vantage.

Reich describes three types of jobs of the future: (1) the routine producers, (2) in-person service providers, and (3) symbolic-analysts. Since the products of routine producers compete in a worldwide market, wages for these workers will be determined by global competitive forces. In-person services are provided locally on a person-to-person basis. Their earnings will be determined by local forces of supply and demand. Symbolic-analytic service providers are problem-identifiers, problem-solvers, and strategic-brokers (that is, they bring those with solutions together with those who have the problems; they create teams or webs). Reich states that, "The only true competitive advantage lies in skill in solving, identifying, and brokering new problems" (p. 184).

Reich's central contention is that the idea that we are in the same national economic growth "boat" is no longer valid. We are in different economic boats depending on whether we are routine producers, in-person service providers, or symbolic-analysts. Education is at the very core of this parting of fortunes. Reich devotes considerable attention to the education of the symbolic-analyst. He believes that overall, Americans excel and will continue to excel at symbolic-analysis because:

> *(1) no nation educates its most fortunate and talented children--its future symbolic analysts--as well as does America; (2) no nation possesses the same agglomeration of symbolic analysts already in place and able to learn continuously and informally from one another (p. 226).*

Unfortunately, most students receive a very different kind of education, leaving them with no choice but to compete with the routine producers of the world, or the local in-person providers (Teixeira and Swaim). Those fortunate enough to grow up in the homes of symbolic-analysts or to go to one of the best schools are provided with these bases.

Implications for Rural America

Reich makes a point that is particularly important to those of us concerned with rural economic development and the welfare of rural people.

> *In the United States as in no other nation, symbolic analysts are concentrated in specialized geographic pockets where they live, work, and learn with other symbolic analysts devoted to a common kind of problem-solving,-identifying,and-brokering (p. 234).*

It seems that a form of symbolic-analytic agglomeration is emerging.

> *. . .[T]he symbolic-analyst zone functions as a kind of large informal organization all its own, whose members' skills are combined in certain ways for particular projects and subsequently recombined in different ways for others (p. 237).*

In the case of traditional agglomeration economies, rural areas are disadvantaged by their sparse population, simple economies, and large distances. In the case of symbolic-analytic agglomeration, if indeed such a thing exists, rural areas may be further disadvantaged by their historically high levels of poverty, poor education, and selective out-migration of better educated and skilled youth. If this hypothesis is correct, then large areas of rural America may continue to slide into relative poverty and

underdevelopment with a growing disproportion of the nation's routine-producers. In-person service providers will necessarily be distributed more evenly, but even here those service providers in rural areas will be compensated at a lower level because of the lower incomes of those that pay for the services. Some rural areas will become the playgrounds and the retirement havens of the symbolic-analysts and a few may become enclaves of the more affluent class, but rural areas in general will find it harder and harder to compete particularly because of their education systems.

Conclusions

The discussion above is at the same time optimistic and pessimistic. It is optimistic about the benefits of education to national economic growth, but pessimistic about the fortunes of most rural areas. But within the potential problems facing rural areas is the possibility that reform of our educational system accompanied by the development of ideal conditions for symbolic-analytic agglomeration might create a better future for rural areas. Reich writes that

> *[t]he threads of the global web are computers, facsimile machines, satellites, high-resolution monitors, and modems--all of them linking designers, engineers, contractors, licensees, and dealers worldwide...In the high-volume economy...economies of scale necessitated a central location...Intellectual and financial capital can come from anywhere, and be added instantly (p. 111).*

Rural areas, if linked to these global webs and provided with the financial resources to produce high quality education, could become the location of choice of many symbolic-analysts. Furthermore, research suggests that given better prospects of jobs in their community, many youth would stay in school longer and perform better (Broomhall and Johnson).

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Investing in Government Public Services: Is It Necessary for Rural Development?

Rodney L. Clouser*

Introduction

Jobs of state legislators and county commissioners are not easy. Raising and allocating money for the provision of public services and infrastructure is a difficult task. The public notices the difficulty faced by elected decision makers only when a fiscal crisis occurs. What the public does not often recognize is that a budget crisis exists in most state legislatures and county commissions every year. The collective "wants" of the individual legislators and commissioners, and of special interest groups, almost always exceeds the tax revenue available.

It is extremely difficult when addressing issues such as economic development, human capital investment and government taxation and expenditures to articulate problems and issues in regional terms. But my task is to address these issues from a regional perspective in the South. Before proceeding, a caveat needs to be noted. Revenue and expenditure data presented today represents a snapshot in time (1987). Changes have occurred in some state legislatures since 1987 (e.g., Kentucky has significantly altered the state school funding allocation), and the lag in data availability between the altered tax and expenditure structures may not be fully considered.

My hypothesis is that Southern states spend less for public governmental services because the region taxes at a lower rate. In addition, the region has allocated more to physical infrastructure (such as roads, bridges, and fire stations.) than human capital infrastructure. Allocation of government funds to human capital may not be sufficient to ensure economic development, but allocation of appropriate funds for human capital development are necessary if Southern states aspire to compete with other regions in the country.

State and Local Government Expenditures

In 1987, state and local government expenditures by Southern states were significantly lower than the average for the U.S. as a whole. Southern states generally were below the U.S. average per capita expenditure by at least 10 percent (in 12 of the 13 Southern states, the exception being Louisiana which was below the average by 8.1 percent). Expenditures for governmental services ranged from $1907 per capita in Arkansas to $2469 in Louisiana (Figure 1).

As a region, the South has 75 percent of the states that rank in the lowest quartile of all states and the District of Columbia in governmental expenditures. Virginia ranks 34th in terms of state and local government per capita expenditures and this represents the highest ranking of Southern states. Arkansas ranked last (51st) among the 50 states and the District of Columbia in 1987. A complete listing for Southern states is presented in Table 1.

These statistics provide insight, but a fundamental question still remains. Is something fundamentally different about the provision of government services in Southern states compared with the remainder of the country that would explain why per capita expenditures are lower in the South than for the U.S. as a whole? My conclusion is the primary difference in the provision of government services between the South and the remainder of the U.S. is in wage

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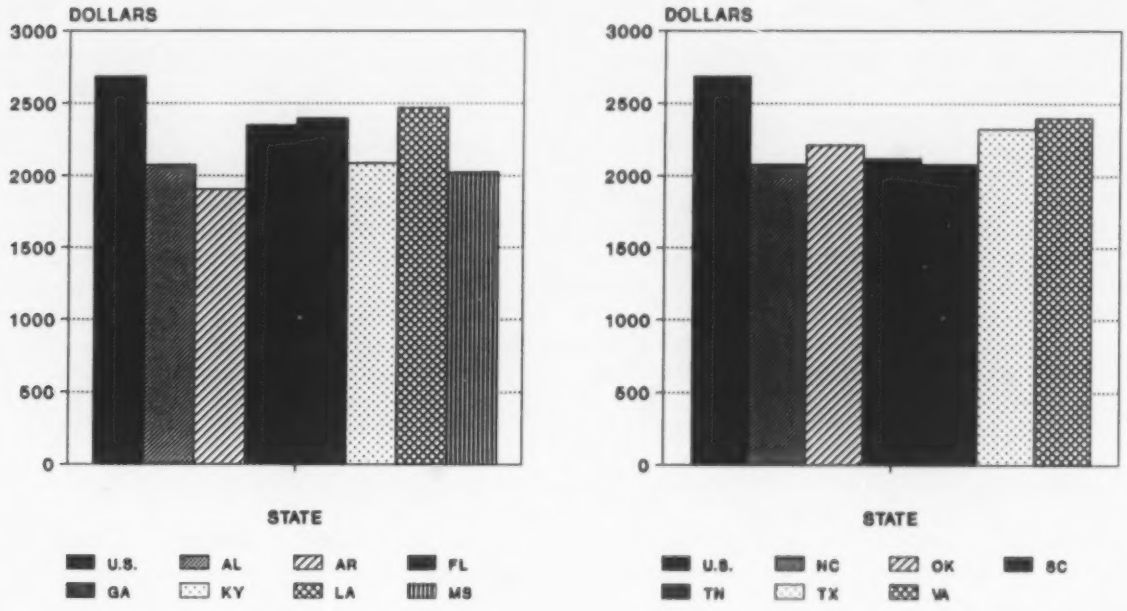


Figure 1. State and Local Government, Per Capita Expenditures, 1987

Source: 1990 U.S. Statistical Abstract

Table 1. State and Local Government Per Capita Expenditures, Rank for Southern States, 1987.

State	Rank	State	Rank
Alabama	48	North Carolina	46
Arkansas	51	Oklahoma	41
Florida	36	South Carolina	43
Georgia	35	Tennessee	47
Kentucky	44	Texas	38
Louisiana	32	Virginia	34
Mississippi	50		

Source: 1990 U.S. Statistical Abstract

rates. Typically, Southern states pay less. As an example, elementary teacher salaries averaged $28,900 in the U.S. in 1989, and $27,000 in Florida. Secondary teachers average salaries in 1989 in the U.S. were $30,300 and the Florida average was $25,800.

Some of this difference may be accounted for by differences in the cost of living in certain areas of the country. However, other school based inputs should be similar. Northern states may pay more for heating but some Southern states probably pay more for cooling. School supplies, computers etc. are required in all systems no matter the geographic location. The same logic applies to other governmental services such as roads, fire, police, and emergency medical services. Inputs are similar expect for wages.

State and Local Government Revenue

Figure 2 demonstrates a significant difference exists in the amount of taxes levied by most Southern states and lends foundation to the earlier hypothesis; Southern states spend less for the provision of government service because they tax at a lower rate. In 1987, two Southern states taxed at a rate higher than the U.S. average, two were equivalent to the U.S. average and the remainder were below the U.S. average. Note again, that tax structure may have changed in some states since 1987 and more Southern states could be taxing at or greater than the U.S. average. The data presented in Figure 2 represents revenue collected per thousand dollars of personal income of state residents by state and local governments.

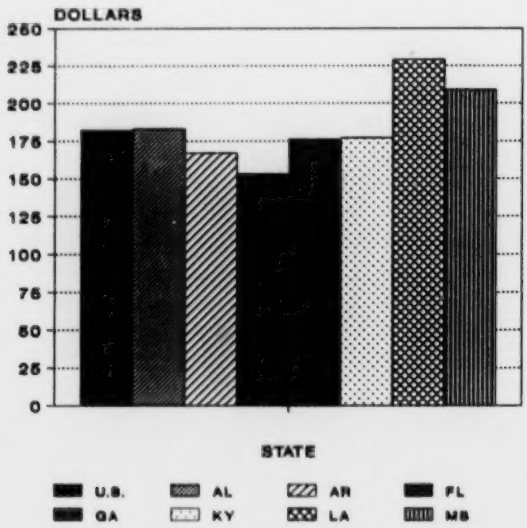
In principle, the numbers reflect the "effective" tax rate for Southern states. Florida and Virginia have the lowest tax rates of the Southern states. The difference in tax rates in Southern states compared to the U.S. average may seem small, but in many instances the difference represents a sizeable amount of dollars. Again, Florida is used as an example because of familiarity with the state. The difference between Florida's tax rate and the U.S. average is $29 per thousand of personal income. Seems rather small. However, in aggregate terms the difference is large. If Florida's effective tax rate was similar to the U.S. average it would have raised another $4-6 billion dollars for state and local governments to provide local and state services.

The "real" tax rate per thousand dollars of personal income, or the amount of taxes paid by state residents, in some Southern states is also considerably less than the numbers reported in Figure 2. Florida for example has an immense tourist industry, about 40 million visitors a year, and its state government is funded primarily through a state sales tax. A considerable portion of those taxes are paid by tourists visiting the state. My estimate would place the amount of taxes paid by Florida tourists in the range of 22-30 percent of state taxes. That means state residents pay only about $110-$125 per thousand dollars of personal income in state and local taxes.

Budget Allocation

Data document that Southern states spend and collect less revenue than other states in the U.S. How do they allocate expenditures among various budget categories? Detailed secondary data for individual states in the Southern region for all budget categories are not available. Substantial data was available for education and highways and these areas will be explored in more detail.

A sub-sample of seven Southern states direct government expenditures for education are presented in Figure 3. Nationally about 34.6 percent of direct government expenditures are spent on education. Southern states compare favorably with the national allocation with a range in the sub-sample presented between 31 percent (Louisiana) and 41.6 percent (Arkansas). However, this does not imply that Southern states are spending the same per capita amount on education as other states in the U.S. as revealed by Figure 4.



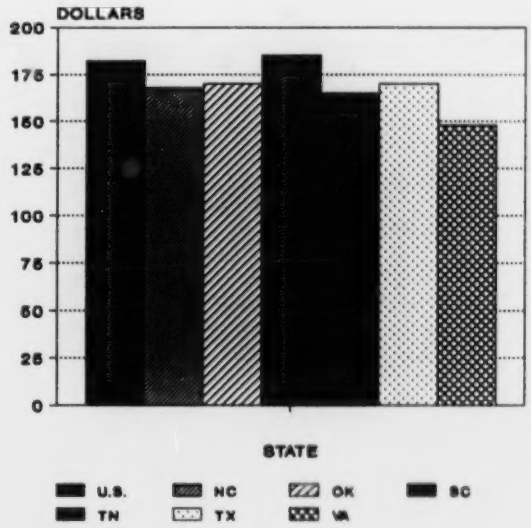


Figure 2. Revenue per Thousand Dollars of Personal Income, 1987

Source: 1990 U.S. Statistical Abstract

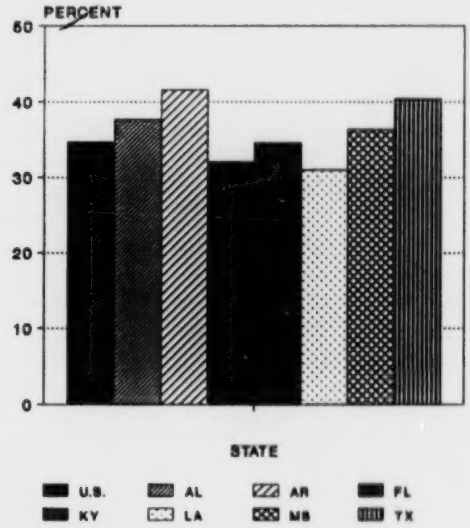


Figure 3. State and Local Government Expenditures on Education as a Percent of Total Expenditures, 1987, Selected States

Source: 1990 U.S. Statistical Abstract

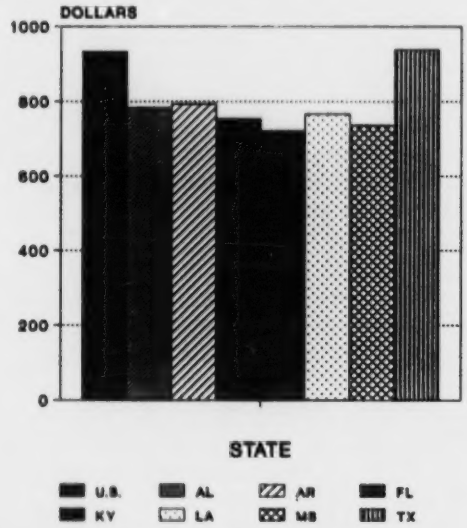


Figure 4. Per Capita Education Expenditures by Units of State and Local Government, Selected States, 1987.

Source: 1990 U.S. Statistical Abstract

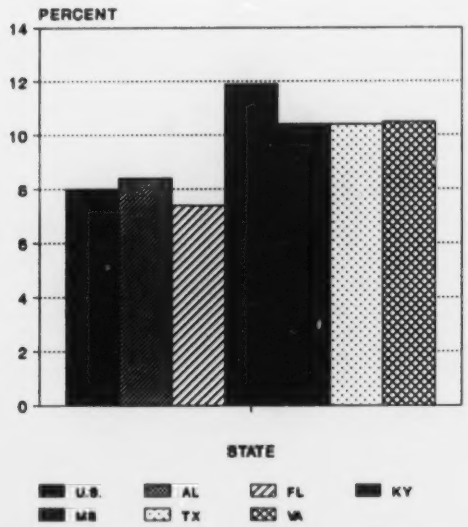


Figure 5. Highway Expenditures as a Percent of Total State and Local Government Expenditures, Selected States, 1987
Source: 1990 U.S. Statistical Abstract

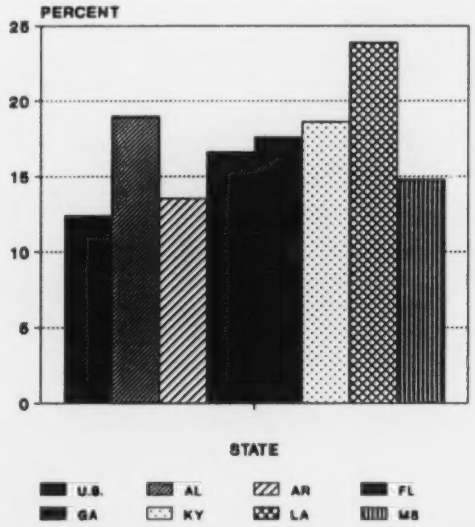


Figure 6. Percent of People Below the Poverty Level, Selected States, 1987

Source: 1990 U.S. Statistical Abstract

Figure 4 indicates the national average for state and local government per capita expenditures is approximately $931. Of the seven southern states Texas ($938) spends slightly more than the U.S average but the other six Southern states spent at least $139 per capita less than the U.S. average.

Figure 5 presents direct general highway expenditures as a percent of total local and state government expenditures. In five of the six Southern states presented the percentage of the budget allocated to highway expenditures exceeds the national average. The exception is Florida which allocated 7.4 percent of its total direct general expenditures to highways compared to the U.S. average of 8.0 percent in 1987. On a per capita basis three states (Kentucky, $249; Texas, $241 and Virginia, $253) exceeded the average per capita expenditure of the U.S ($214). One state, Mississippi, $210, had per capita expenditures comparable to the U.S. average, and two states, Florida ($175) and Alabama ($174) were below the U.S. per capita average.

Two states (Texas and Virginia) exceeded the U.S. average expenditure per capita on education but five Southern states (Arkansas, Kentucky, Louisiana, Texas and Virginia) exceeded or equaled the per capita expenditure on highways. Statistics such as this should at least induce individuals to ask the question, "Is it easier to invest in physical infrastructure in the South than in human capital infrastructure?" Of course, that question can't be answered without more detailed analysis. However, the data for education and highways suggests this trend may be evident.

Performance Criteria

Are Southern states underinvesting in human capital? Some data suggest this may be a legitimate concern. Figure 6 indicates that 12.4 percent of people in the U.S. were defined as being "poor" and therefore below the poverty level in 1979 (last data available on a state by state basis in 1990 U.S. Statistical Abstract). All southern states, except Virginia, exceeded the U.S. average.

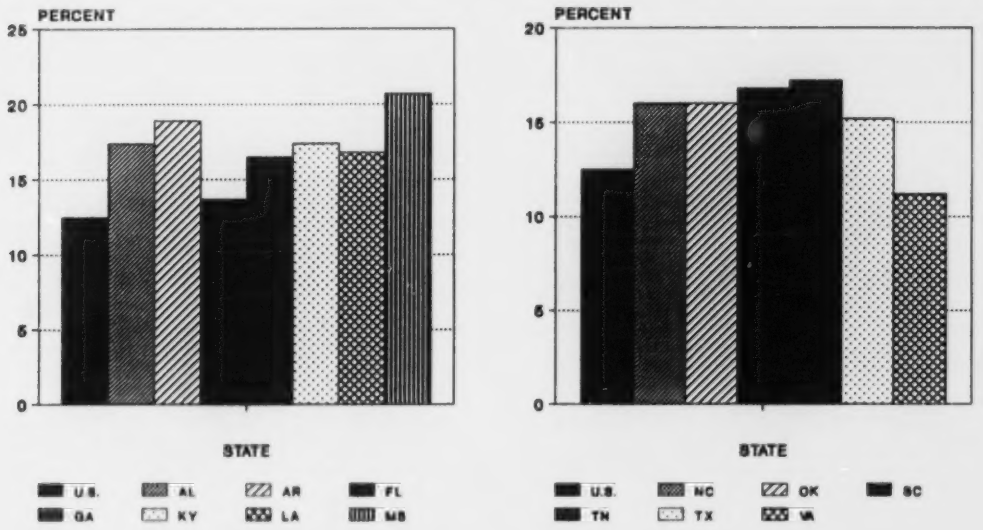


Figure 7. Percent of Total Births to Teenage Mothers, 1988.
Source: 1990 U.S. Statistical Abstract, and 1991 Florida Statistical Abstract (Kentucky data for 1986.)

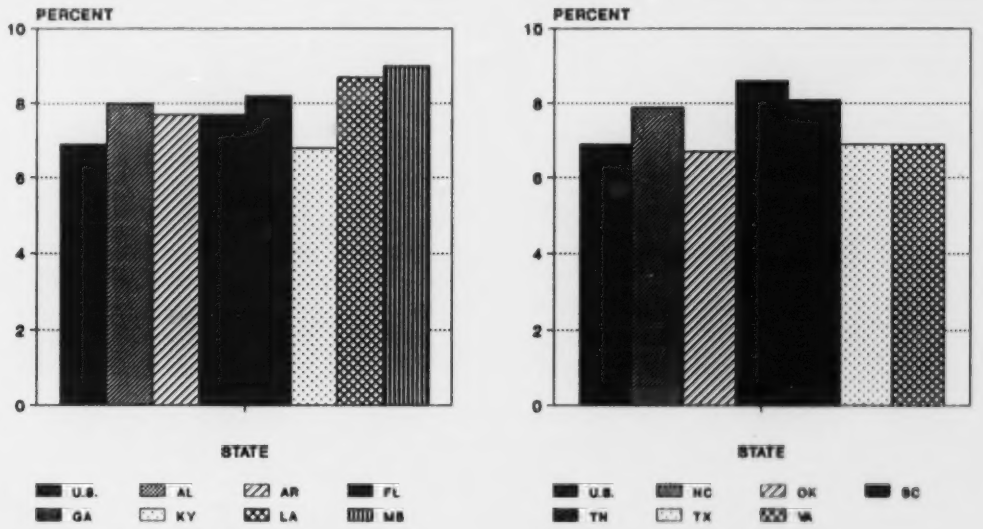


Figure 8. Percent of Total Births with Low Birth Weights, 1988
Source: 1990 U.S. Statistical Abstract

Figure 7 presents information on the percentage of total births to teenage mothers in 1988. A selected sub-sample of seven Southern states eveals that the percentage is larger in every state except Virginia. Figure 8 reports the percentage of total births with low birth weights. A portion of this percentage is attributable to the teenage mothers reported in Figure 7. In nine Southern states the percentage of births with low birth weights exceeds the national average.

It is impossible to separate the issues of poverty, teenage pregnancy and low birth weights. Cultural factors play some role but the

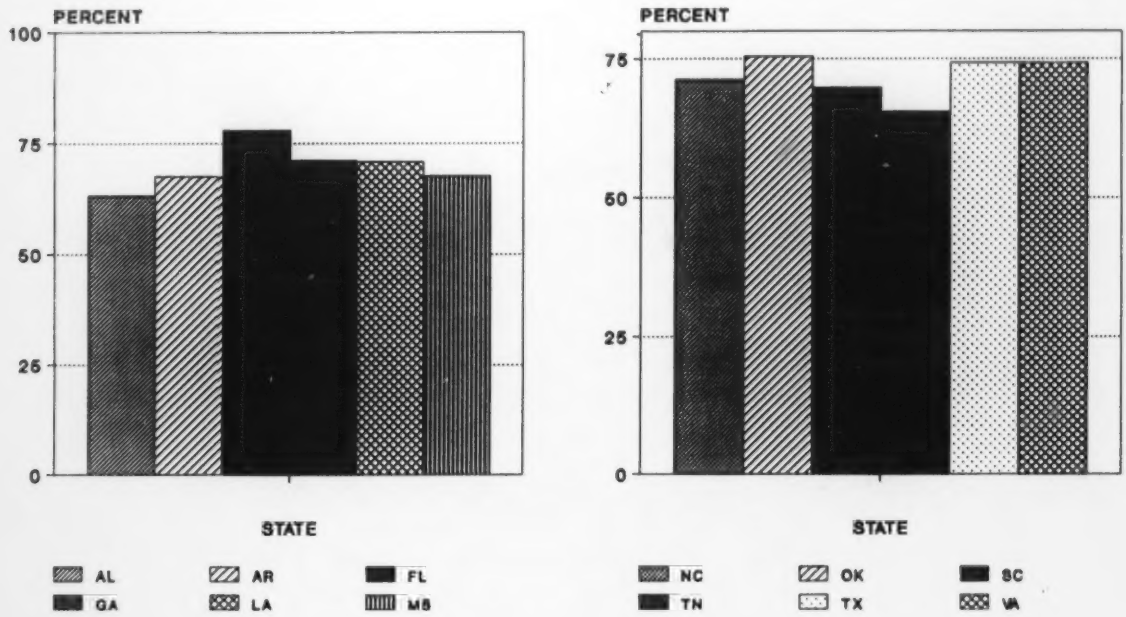


Figure 9. Percent of the Population 25 or Older that are High School Graduates, or have a GED Equivalent, 1989.

Source: 1991 Florida Statistical Abstract

level is unknown. At the same time, investments in human capital play a substantial role. Poor education and poor training lead to poverty. Poverty and the lack of education contribute to teenage mothers, children raising children, who can't afford or seek prenatal care. The result of inadequate prenatal care in many instances is physical problems for the child, high hospitalization costs, learning disabilities and more expensive elementary and secondary school programs in the long-run.

Another important social indicator of human capital investment is the percentage of the population with a high school education or the equivalent general education degree (GED). Complete data for the United States and Southern states were not available from the 1990 census but 1989 data were available for 12 of the 13 Southern states (Figure 9). Graduation from high school for individuals older than 25 ranged from 63.3 percent in Alabama to 77.9 percent in Florida. However, it can be concluded Florida's rate has been distorted on the high side by migration to the state. For example, in rural North Florida, where in-migration has been relatively low, eight counties had in excess of 50 percent of their population age 25 or older who were not high school graduates in 1985. About 70 percent of the 41 counties in north central Florida had in excess of 40 percent of their population who were not high school graduates in 1985. Low educational levels are most likely the result of underinvesting in the regions human capital base.

Individual statistics on other social indicators such as crimes, incarcerations, etc. for individual Southern states also indicate problems with the human capital base. Granted, not all problems can be attributed to underinvestment in human capital and not all problems will be solved by larger investments in human capital.

Conclusion

The brief time allocated in this symposium to human capital issues will not result in any definitive conclusions being reached. However, aggregate data from across the region appears to indicate that at least some states in the South are underinvesting in human capital. The level of governmental services delivered, no matter the service, is dependent upon the level at which the services are funded. In modern jargon it might best be summed up "you get what you pay for." Many Southern states do not appear to be paying for the best.

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The First Job Decision and the Probability of Off-Farm Work

Judith I. Stallmann and James H. Nelson*

Introduction

Much of the literature on off-farm work by farm families begins with a discussion of whether farm families are being pushed off the farm by farm debts or pulled off the farm by better economic opportunities (Buttel, 1982; Fuguitt, 1958, Spitze and Mahoney, 1988). Such discussion assumes the family was farming and then made decisions about off-farm work. As a result, much of the literature assumes that part-time farming is transitional and that the goal of the family is to be full-time on the farm. The increasing trend in the percentage of operators working off the farm, as documented in the *Census of Agriculture*, is a strong argument that part-time farming is *not* transitional.

Findeis, Lass and Hallberg (1991) note that "Declines in rural wages in manufacturing and in the service sector in some regions make it more unlikely that labor will move out of agriculture." But this scenario may increase the likelihood of labor moving into agriculture to supplement declining wages. Non-farm families might be pushed or pulled into farming. The non-farm family may be pulled into farming by an attractive lifestyle. The family might also be pushed into farming by the need for a tax shelter or for additional income. The latter position was voiced by many studies of part-time farming during the depression (Salter and Diehl, 1940). At that time part-time farming was viewed as a supplemental income for low industrial wages. In fact, the declining trend in farm numbers, which began in 1921, reversed during the depression, and then continued downward again (Ahearn and Lee, 1991).

In a comparative study of part-time farm families in Wisconsin and Japan, Kada (1980) found that a substantial number of part-time farmers in Wisconsin entered farming while holding other jobs. Families for whom farming was the second decision differed from families for whom farming was the first decision in motivations, choice of enterprise, etc. Bartlett (1991) also found a high percentage of part-time farmers (67.4%) who entered farming while holding an off-farm job. A second smaller group began as full-time farmers and became part-time farmers as a result of farm economic conditions.

Even studies which accept that a decision to farm may have come after the decision to work off the farm, usually continue to assume that the farm is the primary commitment of the family. Mage (1976) suggests that such assumptions be tested by examining the intentions and motivations of part-time farmers.

This paper discusses preliminary research comparing these two groups of farm operators and their motivations and intentions. The first job choice of the operator--farming or non-farming--may lead to very different decisions about farm enterprises and the use of farm inputs. The first job decision may also lead to very different decision processes over the long run in terms of off-farm work. This study examines factors which affect the decision to work off the farm. In particular, the paper will focus on the impacts of education and location on the probability of working off the farm. Differences between the two groups may have contributed to some of the inconsistent findings of previous research concerning the impacts of education and location on the probability of working off the farm.

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Data

The data are from a survey of 785 farm operator families in Virginia for 1988. The analysis focuses on farm families who are not retired. Retired farm families were defined as families where both the operator and spouse (if married) are over 65 and not working off the farm. When retired operators and observations with missing variables are removed from the data set, 600 observations remain.

During the survey, respondents were not asked directly if the first job of the operator was on or off the farm. The respondents were asked the number of years the operator had farmed and the number of years the operator had worked off the farm. From this information two groups of operators were defined:

1) Those who have more years of off-farm than on-farm experience. These operators will be referred to as workers.

2) Those who have more years of on-farm than off-farm experience. These operators will be referred to as farmers.

An operator who began with an off-farm job and became a full-time operator for some years may be classified in group two, depending upon the relative number of years spent as a full-time operator. Only operators are used because the survey did not provide a good measure of the spouse's years of on-farm experience.

Model

The probability of working off the farm is influenced by the wage which the operator can expect to receive. The wage in turn is influenced by the jobs available (labor demand) within commuting distance and whether the operator has the job skills to match the jobs available. In addition the operator faces factors which may encourage or discourage working off the farm. These factors include the demand for the operator's labor on the farm, and the need for additional sources of income. The reader is referred to Reddy and Findeis (1988) and Gunter and McNamara (1990) for the theoretical development of the probability model.

Measures of the operator's job skills include the operator's age, vocational training, and formal education. Both age and age squared are used in the equation to reflect the expected deterioration of job skills over a lifetime. Age is expected to have less of an impact on the probability that the worker works off the farm than on the farmer. Vocational training is defined as a binary variable with a value of one if the operator has vocational training. Vocational training is expected to increase the probability that the operator works off the farm.

Education increases the job opportunities open to the operators. The impact of education on farm/off-farm work is ambiguous because education can raise the marginal value product of labor in both uses. Some research suggests that education has more impact on the off-farm wage than on the on-farm marginal value product and thus tends to encourage off-farm work (Findeis and Reddy, 1988; Gunter and McNamara, 1990; Lass, Findeis and Hallberg, 1991). On the other hand, Simpson and Kipitany (1983) found varying impacts of education among subgroups of operators in their sample. Findeis, Lass, and Hallberg (1991) found that education had no effect on the probability that Pennsylvania operators work off the farm. If farmers take whatever job is available, rather than trying to closely match the job with their skills, the impact of education on their probability of working off the farm may be less than that of the worker.

The choices open to farm families will be limited by the off-farm labor demand. Location is one aspect of this demand--are they located within commuting distance of a job, or did they buy a farm within commuting distance of a job? Workers are more likely to be located in areas where jobs are readily available. Farmers are more likely to have chosen the farm location without much consideration of off-farm job possibilities.

Findeis, Lass, and Hallberg (1991) find that location has generally been a poor indicator

of off-farm work. Most studies have used binary variables to delineate location along political boundaries such as states or counties (Reddy and Findeis, 1988). Several studies have used binary variables to break states into several broad geographic regions (Sumner, 1982). Findeis, Lass, and Hallberg (1991) used structural variables at the county level. Several of these variables did have an impact on the probability of off-farm work. In addition the use of structural variables points more clearly toward policy options than does the use of binary variables.

Political jurisdictions, while convenient because of data availability, do not necessarily correspond to the area in which an operator might search for a job. Labor Market Areas, which are based on commuting patterns, may be more appropriate location variables as a proxy for labor demand (Tolbert and Killian, 1987). Gunter and McNamara (1990) used structural variables of labor markets to estimate the probability of off-farm work and off-farm labor hours. Not all of the structural variables affected the probability of working off the farm.

Gunter and McNamara (1990) used two measures of general labor demand in the LMA: the unemployment rate and total employment. Both of these variables were expected to reflect employment opportunities and wage levels.

For this model the unemployment rate was chosen to reflect wage levels and competition for jobs. The probability the operator will work off the farm is expected to be negatively related to the unemployment rate. Because LMA's are constrained to a minimum size of 100,000 population, some counties with weak commuting ties are included in a single LMA. Thus, total employment in the LMA does not accurately reflect the availability of jobs within commuting distance. Employment density was used as a more accurate measure of job availability within commuting distance. The higher the employment density, the more likely operators will work off the farm. Because farmers are less likely than workers to have located based on job opportunities, employment density is expected to have a greater impact on workers than on farmers.

In addition, Gunter and McNamara (1990) chose employment sectors which provide flexible working hours and used the percent of total employment in those sectors in the equation. The majority of Virginia operators who work off the farm are employed full-time and prefer those hours. Therefore, the percent of total labor market employment in those sectors in which the operator is most likely to be employed is included in the equation. It is likely that these sectors best match the educational and skill levels of the two groups of operators and also allow the hours operators want. The sectors in which Virginia operators are most likely employed are: services (25% of operators who work off the farm), construction (18%), public administration (17%), and manufacturing (13%).

Factors which affect the supply of off-farm labor include the other sources of income for the family: unearned income, net farm income, and income earned by the spouse. Additional income is expected to reduce the probability that the operator will work off the farm. The number of children in the family may increase the probability of working off the farm as extra income is needed to support larger families. The hours the operator works on the farm are expected to constrain the hours available for off-farm work. The worker may fit farm hours to the off-farm job, so that on-farm hours are expected to be less of a constraint to the probability of working off the farm.

Empirical Analysis

Table 1 compares the average characteristics of the two groups of operators. The operators differ in average years of education and in the percentage of operators who have vocational training. Workers have nearly a year more of education. In addition, a higher percentage of workers have vocational training.

There is no difference in the average age of the two groups of operators. Although there is no theoretical reason to expect a difference,

Table 1. Characteristics of Farm Operators and Farms

	Farmers	Workers	Difference Statistically Significant?
Average Years of Operation	11.6	12.4	yes
% with Vocational Education	28.9	51.4	yes
Average Age	53.7	52.5	no
Average Family Income	37,250	43,600	yes
Average Spouse Income	4,402	6,961	no
Average Unearned Income	3,935	5,317	no
Average Years of Off-farm Experience	11.2	29.7	yes
Average Years of On-farm Experience	31.8	19.9	yes
% Currently Working Off the Farm	31	63	yes
Average Acres in Production	200	90	yes
Operator's Average Annual Hours on the Farm	2,315	1,328	yes
Average Net Farm Income	18,087	7,582	yes
% with Debt to Asset Ratio $\leq .4$	9	9	no
% Plan to Continue Farming	93	93	no
% Hire Labor	53	49	no
Number of Observations	377	223	

some generational difference might have been expected.

Family income differs between the two groups with workers having higher family incomes. Two components of family income, spouse's income and unearned income, do not differ significantly between the two groups. Years of farm and off-farm experience also differ between the two groups. Currently 31% of the farmers and 63% of the workers work off the farm.

Similar to findings by Kada, the farms of these two types of operators differ in acreage, hours on the farm, and net farm income. The two groups of operators do not differ on their debt-to-asset ratios, whether they hire labor and whether they plan to continue farming.

Three participation equations were estimated (Table 2). The first equation pooled the two groups of operators, as has generally been done, to estimate the probability of off-farm employment. Then a separate equation was estimated for each group to test for the hypothesized differences between the two groups.

The coefficients in the pooled equation are, for the most part of the expected signs. Age has a positive effect on the probability of working off the farm and age squared has a negative impact with a turning point of about 49 years of age. Education and vocational training increased the probability of working off the farm. On-farm hours, unearned income, and net farm income decreased the probability that the operator worked off the farm. Location generally does not affect the probability of working off the farm.

The separate equations estimated for farmers and workers differed from the pooled equation and from each other. For farmers the age variables have the expected signs and a turning point of 50 years of age. Not only does age have less of an impact, as hypothesized for the workers, its impact is not significant. Workers are probably more committed to their jobs as careers so that they continue that career throughout their life.

Although education was hypothesized to have less of an impact on the probability that the farmers would work off the farm, its insignificant coefficient was unexpected. Education has a positive effect on the probability that workers will work off the farm. On the other hand, the impact of vocational training was positive for farmers and insignificant for workers. When the farmer takes a job it is less easy to fit the job to the farmer's education because of the farmer's fixed location. It may be more important to fit the job to hours of on-farm work. Vocational training offers a rapid method of acquiring the skills needed to fit the farmer's skills to the jobs that are locally available. The inconsistency in previous research of the impact of education on the probability of working off the farm might be explained by the relative mix of the two groups in the pooled equation.

The number of hours worked on the farm decreases the probability that the farmer will work off the farm. As hypothesized, the probability that a worker will work off the farm is not affected by the hours of farm work. Workers mostly likely enter farming by fitting their farm around their work schedule.

Contrary to expectations, the labor market structural variables had no impact on the probability of farmers working off the farm. A check of the data revealed that there is very little variation across labor markets in the percentage of farm operators who work off the farm.

The probability that workers work off the farm is affected by location factors, proxies for local labor demand. This may reflect the original location decision of workers. If workers originally chose dynamic labor markets, remaining in those markets allows them to continue their non-farm jobs. The positive relationship between unemployment and the probability of workers working off the farm is surprising but may be measuring the "push" of workers into part-time farming as wages fall.

Table 2. Probability That the Operators Work Off the Farm

	Pooled	Farmers	Workers
Constant	-2.857 (1.803)[1]	-1.732 (2.322)	-5.472 (4.010)
Age	.097 (.050)**	.118 (.062)**	.054 (.126)
Age squared)	-.001 (.000)**	-.001 (.000)**	-.000 (.001)
Education	.063 (.024)**	.033 (.032)	.153 (.050)**
Vocational training (1=yes)	.469 (.150)**	.563 (.196)**	.430 (.293)
Sex (1=male)	.224 (.286)	.202 (.374)	.135 (.533)
On-farm hours (100's)	-.060** (.000)	-.064 (.000)**	-.020 (.000)
Number of children	.096 (.082)	.075 (.097)	.101 (.204)
Spouse's income ($1000's)	.003 (.000)	.005 (.000)	-.008 (.000)
Net farm income ($1000's)	-.025 (.000)**	-.023 (.000)**	-.039 (.000)**
Unearned income ($1000's)	-.035 (.000)**	-.016 (.000)	-.080 (.000)**
% Construction	.099 (.115)	-.030 (.143)	.476 (.259)*
% Services	-.034 (.035)	-.013 (.045)	-.140 (.077)*
% Manufacturing	.011 (.015)	-.005 (.020)	.032 (.028)
% Public administration	.250 (.017)	.014 (.023)	.057 (.032)*
Unemployment rate	.087 (.053)*	-.011 (.068)	.333 (.115)**
Employment density	.001 (.002)	-.001 (.002)	.013 (.006)**
Log likelihood	-222.40	-140.33	-58.81
Chi-Squared (16)	255.52	140.89	89.86
% Correct Predictions	81	81	87

[1] Standard errors
* Significant at .10 level
** Significant at .05 level

Summary

Many part-time farm operators have entered farming from a non-farm job. The operator's first job choice appears to have lasting impacts on their labor responses. Younger farmers and those with vocational training are more likely to work off the farm. Although education does not affect the probability that farmers will work off the farm, it increases the probability for workers. Farm hours decrease the probability that farmers will work off the farm, but has no impact on workers. Both groups of operators are less likely to work off the farm as other sources of income increase.

Rather than assuming that farm operators are pushed or pulled off the farm, researchers and policy makers must consider that workers may also be pushed or pulled onto the farm as relative returns to labor vary between sectors.

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Education and Economic Development In Rural Appalachia

Thomas G. Johnson and David E. Broomhall*

The Changing Economic Environment in Rural Communities

Major changes have occurred in the economic structure of rural America. No longer are rural economies dependent primarily on agriculture, forestry, or mining. Declining employment in these sectors has led to the need for diversification into manufacturing and service industries. Some rural communities have adapted quite well to these economic challenges and have prospered. But many have not. Particularly hard hit has been the coal region of central Appalachia. Various factors have contributed to an overall decline in economic prosperity, and have caused this region to fall further behind the nation as a whole in virtually all measures of economic well-being.

One reason for the lack of economic growth in the Central Appalachian region is the nature of its work force. The coal-based economy has historically provided disincentives for young people to invest in education because the returns to this investment have been low or negative (Bluestone, Murphy, and Stevenson, 1973). Long term under-investment in education has resulted in a work force that is not highly adaptable to employment in other industries. Employers who require skilled workers and who pay higher wages are discouraged from locating in the area by the less educated labor force. Only those firms that require low skilled labor and that are attracted by low wage rates are likely to consider locating in the region. Establishment of these kinds of low-skill, low-wage jobs contributes little to local economic prosperity and may lead to further declines in the local quality of life.

Educational Investment in Underdeveloped Communities

The purpose of this study was to gain a better understanding of the process by which individuals make decisions regarding education. More specifically, the research examines the system of incentives in the coal counties which might discourage students from performing well scholastically. The primary hypothesis tested by this research was that local economic and social conditions and attitudes influence the accumulation of human capital by influencing people's perceptions of the value of education. The value of education in the context of this study refers to its contribution to future occupational opportunities and increased quality of life.

Human capital is a term used to describe investment in the productivity of labor. Human capital includes formal education and a variety of other aspects of productivity including on-the-job-training and improvements in health. Human capital decisions depend, in part, on the individual's attitudes and perceptions of the expected costs and returns to that investment. One's attitudes develop in reaction to influences from the family, from casual interaction with, or observation of others in the community, and from influences outside the local community. Of particular importance in the human capital investment decision of rural residents are attitudes toward one's community, the willingness to move away to obtain employment, attitudes toward employment in the community's traditional occupation (farming, mining, logging), and attitudes toward education and educated people.

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Since much of Appalachia is isolated--both geographically and economically--one's willingness to move may have an important influence on the value one places on education, as the acquisition of skills necessary to compete successfully in labor markets elsewhere is critical. Since formal education is the primary source for development of these skills, those who live in areas where economic opportunities are limited and who are more willing to move away will have a greater incentive to perform well in school. Those less willing to leave need only consider local returns to education, and therefore perceive that the potential returns to investments in education (good paying jobs which require an education) are either too low or too uncertain to justify the sacrifice required. At the same time the community's investment in the education of it's youth is not returned when they migrate to other communities to find jobs. This creates an incentive for the local community to provide a level of support for education below that which is socially optimal.

A student's decision to stay in school and to perform well in school are determined by their personal utility function and their perceived opportunities with and without an education, that is, the expected economic returns to education. The term "expected" is important here, since the incorporation of expectations introduces the likelihood that individuals will have different expectations about the same set of future alternatives. These expectations will depend on the amount and quality of information available, and upon the process by which individuals form their expectations about the future. The process by which individuals form expectations or perceptions of the returns to education is important in the decision process. Perceptions are developed from information received from a variety of sources including one's family, others in the community, community institutions, schools, and the media. These factors are part of a process by which an individual develops a set of attitudes which permits an ordering of all possible future outcomes. The individual's perceptions of future wages and occupations and observations of economic and social realities dictate an optimal strategy upon which the individual will act with reasonable confidence.

The Data

This research was designed to achieve two primary objectives. The first objective was to document the attitudes that high school aged youths and their parents have regarding education and occupational choice. The second objective was to determine the manner in which factors in the local community influence the valuation of education, academic performance, plans to acquire additional education or training, and occupational choice.

To address these objectives, a survey was conducted in four rural school districts in Appalachia. The four school districts chosen for this study were: Montgomery County, Kentucky; Montgomery County, Virginia; Wise County, Virginia; and the City of Norton, Virginia. The primary criteria for choosing these school districts was that they represent rural Appalachian communities with significantly different industrial bases and local economic opportunities. Table 1 shows the employment base in the four schools districts by major industrial sector. Montgomery County, Kentucky had a population of 19,561 in 1990. Its economy is dominated by several medium to large manufacturers. Two of the larger employers are garment factories which together employ approximately 570 people. Three large manufacturing plants, together employing over 1,400 people, produce electrical machinery and household appliances. Several smaller manufacturers produce a variety of goods such as wire fasteners, motors, plastic drums, and other mechanical equipment.

Wise County and the City of Norton, Virginia are located in the coal fields of Southwestern Virginia. They had 1990 populations of 39,537 and 4,247 respectively. The major industry in the area is coal mining, which provides over 4,000 jobs directly and many more indirectly in such industries as heavy equipment building, explosives, and mine services. Montgomery County, Virginia had a

Table 1. Employment in Major Industrial Sectors by School District.[a]

Industry	Montgomery Kentucky	Wise Virginia	Norton Virginia	Montgomery Virginia
Mining	1.3%	35.5%	15.4%	b
Construction	6.9%	2.6%	3.6%	5.0%
Manufacturing	28.9%	4.5%	7.6%	38.5%
Transportation & Public Utilities	2.1%	3.8%	6.9%	1.2%
Wholesale Trade	10.8%	5.5%	11.9%	2.0%
Retail Trade	25.4%	23.9%	22.8%	29.5%
Finance, Insurance, and Real Estate	5.1%	4.2%	4.1%	4.6%
Services	17.5%	19.3%	27.7%	17.6%
Other	2.0%	0.7%	0.0%	1.6%

[a] Excludes government employees and railroad employees, and self employed persons. Since the data do not include government workers, the impact of the services sector is understated, particularly in Montgomery, Virginia, where 30 percent of the employment is in government. This compares to proportions of 20 percent and 16 percent for Wise and Norton, respectively.

[b] Less than one percent.

Source: U.S. Dept. of Commerce, Bureau of the Census. *County Business Patterns*, 1988, vols. 17, 48.

population of 73,913 in 1990. Its economy is diversified in manufacturing and services. Virginia Tech is the County's largest employer. A number of large to medium size manufacturing firms produce propellants and explosives, automotive parts, apparel, furniture, and electronic components. There are also a large number of small high tech manufacturing and service firms. Table 1 is less reflective of employment patterns in Montgomery, Virginia, because it does not include government employees

The analysis was based on surveys of high school seniors and their parents in each of 12 high schools in the four school districts. The research focused on a variety of factors hypothesized to influence the valuation of education and academic performance. Of particular importance were the attitudes and behavior of dropouts in comparison to those of graduating students, as dropouts comprise a large proportion of the adult population in many counties in Appalachia. Therefore, the survey was also administered to high school dropouts who would have graduated with the high school seniors had they not dropped out. One parent of each dropout was interviewed as well. The students were interviewed in large groups at each of the high schools while the dropouts and all of the parents were interviewed by telephone. The survey data were augmented by school records of performance on standardized achievement tests, and grade point averages. Table 2 shows some pertinent statistics related to the survey.

The Statistical Analysis

The youths were asked to respond to a variety of statements to determine the value placed on education, the willingness to move away to get the type of job they prefer, and the perceptions of local job opportunities. Table 3 shows definitions of the variables associated with these statements. Responses were noted as to whether they strongly agreed, somewhat agreed, neither agreed nor disagreed, somewhat disagreed, or strongly agreed with the statement.

Table 4 shows descriptive statistics of the variables associated with the valuation of education by school district. The first two variables indicate a willingness to support education through increased taxes and by setting certain standards of performance. Interestingly, the dropouts showed a statistically higher propensity to support the concept of performance standards than did the students. The two variables showing the perceived value of a high school diploma and college degree require some clarification. The youths were asked to respond to three statements regarding the types of jobs one is prepared for without a high school diploma, with a diploma, and with a college degree. The value of a high school diploma was defined as the difference between the type of job one is prepared for with and without a high school diploma, and the value of a college degree as the difference between having a diploma and having a college degree.

The means of diploma value in Montgomery, Virginia and Montgomery, Kentucky are both lower than Wise and Norton, but likely for different reasons. Employment opportunities in Montgomery, Kentucky are primarily unskilled or low skilled production and manufacturing jobs, jobs for which a high school diploma may provide only small marginal returns. In Montgomery, Virginia there is a wider range of employment opportunities, and many youths may have set their sights on some of the higher skilled, higher paying jobs which require more education than a high school diploma provides, and therefore place a low value on a high school diploma.

Table 5 shows that the youths in Montgomery, Virginia have a much more positive perception of employment opportunities for both high school and college graduates than the other three school districts. This probably reflects an accurate perception, given the more vibrant and more diverse economy in Montgomery Virginia. Simple correlations for the entire population between 3_HOURS_AWAY and both DIPLOMA_JOBS and DEGREE_JOBS, and OUT_OF_SOUTH and DEGREE_JOBS were found to be

Table 2. Response Rates of Students and Their Parents by School.

School	Enrollment	Students Surveyed	Percent	Parents Surveyed	Percent
Montgomery Co. KY					
Mt. Sterling HS	269	184	68%	159	86%
Wise Co. VA					
Appalachia HS	71	56	79%	43	77%
Coeburn HS	123	57	46%	43	75%
J.J. Kelley HS	144	104	72%	75	72%
Pound HS	62	23	37%	17	74%
Powell Valley HS	168	60	36%	50	83%
St. Paul HS	40	23	58%	20	87%
County Total	608	323	53%	248	77%
Norton VA					
J.I. Burton HS	60	38	63%	31	82%
Montgomery Co. VA					
Auburn HS	73	18	25%	16	89%
Blacksburg HS	270	114	42%	71	62%
Christiansburg HS	195	60	31%	29	48%
Shawsville HS	45	7	16%	6	86%
County Total	583	199	34%	122	61%
Total	1520	744	49%	560	75%

Table 3. Description of Variables Used in the Statistical Analysis.

Variable Name	Description
LIVE_NEAR	Belief that children should try to live near their parents after completion of education.
3_HOURS_AWAY	Youth's willingness to move to a large city three hours away from home to get a job.
OUT_OF_SOUTH	Youth's willingness to move to a large city outside the South to get a job.
DIPLOMA_JOBS	Youth's perception of local employment opportunities for jobs which generally require a high school diploma.
DEGREE_JOBS	Youth's perception of local employment opportunities for jobs which generally require a college degree.
BASIC_TEST	Support for requiring students to pass a basic skills test to graduate from high school.
TAXES	Preference for increasing expenditures for education.
DIPLOMA_VALUE	Perception of the value of a high school diploma in accessing higher quality employment opportunities.
DEGREE_VALUE	Perception of the value of a college degree in accessing higher quality employment opportunities.
SCHOOL_IMPORTANCE	Youth's perception of the importance of education.

Table 4. Summary Statistics of Youth's Valuation of Education by School District.

Variable	School District	N	Mean	Standard Deviation	Minimum Value	Maximum Value
BASIC_TEST						
	MONT_KY	193	3.461	1.399	1.000	5.000
	WISE_VA	349	3.842	1.192	1.000	5.000
	MONT_VA	238	3.899	1.225	1.000	5.000
	NORTON_VA	43	3.814	1.385	1.000	5.000
	Total	823	3.768	1.272	1.000	5.000
TAXES						
	MONT_KY	193	3.440	1.220	1.000	5.000
	WISE_VA	347	3.473	1.166	1.000	5.000
	MONT_VA	237	3.586	1.178	1.000	5.000
	NORTON_VA	43	3.581	1.349	1.000	5.000
	Total	820	3.504	1.192	1.000	5.000
SCHOOL_IMPORTANCE						
	MONT_KY	57	4.351	1.044	1.000	5.000
	WISE_VA	348	4.374	0.799	2.000	5.000
	MONT_VA	238	4.282	0.900	1.000	5.000
	NORTON_VA	43	4.233	0.972	1.000	5.000
	Total	686	4.331	0.868	1.000	5.000
DIPLOMA_VALUE						
	MONT_KY	192	1.411	1.025	-2.000	4.000
	WISE_VA	347	1.643	1.053	-1.000	4.000
	MONT_VA	238	1.412	1.136	-2.000	4.000
	NORTON_VA	43	1.442	0.983	0.0	4.000
	Total	820	1.511	1.072	-2.000	4.000
DEGREE_VALUE						
	MONT_KY	193	0.969	0.841	-2.000	3.000
	WISE_VA	347	1.156	0.886	-2.000	3.000
	MONT_VA	238	1.017	0.981	-4.000	4.000
	NORTON_VA	42	1.238	0.821	0.0	3.000
	Total	820	1.076	0.904	-4.000	4.000

Table 5. Summary Statistics of Perceived Employment Opportunities and the Willingness to Move by School District.

Variable	School District	N	Mean	Standard Deviation	Minimum Value	Maximum Value
DIPLOMA_JOBS						
	MONT_KY	191	1.592	1.037	1.000	5.000
	WISE_VA	347	1.816	1.037	1.000	5.000
	MONT_VA	237	2.354	1.070	1.000	5.000
	NORTON_VA	43	1.628	0.874	1.000	4.000
	Total	818	1.910	1.079	1.000	5.000
DEGREE_JOBS						
	MONT_KY	192	1.859	1.081	1.000	5.000
	WISE_VA	346	2.243	1.108	1.000	5.000
	MONT_VA	238	2.739	1.140	1.000	5.000
	NORTON_VA	43	2.000	1.000	1.000	4.000
	Total	819	2.284	1.152	1.000	5.000
3_HOURS_AWAY						
	MONT_KY	193	3.715	1.180	1.000	5.000
	WISE_VA	348	3.980	1.122	1.000	5.000
	MONT_VA	238	3.471	1.268	1.000	5.000
	NORTON_VA	43	4.186	1.118	1.000	5.000
	Total	822	3.781	1.200	1.000	5.000
OUT_OF_SOUTH						
	MONT_KY	193	3.047	1.251	1.000	5.000
	WISE_VA	346	3.540	1.290	1.000	5.000
	MONT_VA	238	3.063	1.372	1.000	5.000
	NORTON_VA	43	3.535	1.386	1.000	5.000
	Total	820	3.285	1.330	1.000	5.000

statistically significant and negative. This suggests that a negative relationship exists between a youth's willingness to move and the perception of local job opportunities. Further, the willingness to move variables are significantly higher in Norton and Wise than in the two Montgomery's, which may be a response to the relatively lower perception of local job opportunities as shown by DIPLOMA_JOBS and DEGREE_JOBS. However, youths in Montgomery, Kentucky had similarly negative perceptions of local job opportunities but did not show the same high willingness to move.

Hypotheses Tests

Multiple regression analysis was used to evaluate those factors hypothesized to influence the value that individuals place on education and academic performance. Also of importance was the educational and occupational aspirations of the youths. Since the dependent variables were dichotomous in the analysis of educational and occupational aspirations, logit analysis was used to evaluate those factors hypothesized to influence aspirations. Six hypotheses were evaluated by this research. In general the statistical results are not particularly strong but do, in general, support the hypotheses[1] These hypotheses and the resultant conclusions follow.

1. *Those youths whose parents place a higher value on education will place a higher value on education.*

There was only weak support for the hypothesis that this relationship exists.

2. *Those youths who are more willing to move to obtain employment will place a higher value on education.*

There was mild support for this hypothesis. Once other factors are accounted for, the students do not associate the value of education and their willingness to move within the region. However, there is evidence that at least some students willing to move out of the region place a higher value on education.

3. *Perceptions of local employment opportunities influence the value that youths place on education.*

A negative relationship exists between the perception of local job opportunities for jobs which generally require a high school diploma and the value youths place on education. The general hypothesis presented earlier was that the perception of local employment opportunities, together with the willingness to move influence the value one places on education. Significance among these three variables exists in a simple three-way correlation, supporting the hypothesis that those who are more willing to move, and who perceive that local job opportunities are scarce, perform better in school. The regression equations do not show a similar relationship for local jobs which require a college degree.

4. *Those youths who place a higher value on education will exhibit higher academic achievement.*

This hypothesis was supported by the analysis. Those students that supported setting minimum standards to graduate from high school, who believed that school was generally important, and who placed a higher value on a college degree, performed better in school. The value placed on a high school diploma and the willingness to pay for education through increased taxes did not have a statistically significant influence on the value placed on education.

5 and 6. *Those youths who place a higher value on education will have higher educational and occupational aspirations.*

These hypotheses were also supported by the analysis. Youths who place a higher value on education plan to stay in school longer and expect to get better jobs than those who do not. In addition, willingness to move was positively related to the educational and occupational aspirations.

Conclusions and Implications for Rural Policy

Previous research has found that family socioeconomic background is an important factor in explaining educational performance. This suggests that to improve educational performance and perhaps break the cycle of poverty, it may be necessary to improve socioeconomic conditions in the home. However, this study has shown that the perception of the value of education influences performance as well, and that these perceptions are often related to non-familial variables. Therefore, it may be advisable to focus attention on these non-familial factors in an attempt to improve academic performance. It may be more effective, and certainly less costly, to influence performance in this manner than to change socioeconomic conditions in the home.

Much of the research examining the relationship between socioeconomic factors and achievement using disaggregated data was conducted in the 1960s and early 1970s. The findings of those studies consistently showed that socioeconomic factors have a strong influence on academic performance. Those studies which used some measure of attitudes found that they were highly correlated with socioeconomic characteristics. Since that time there have been major changes in the availability and source of information capable of influencing attitudes and behavior. The widespread availability of television in even the most remote areas and the rising amount of time the average American spends watching television undoubtedly has an influence on attitudes. This, and possibly other factors have increased the importance of external influences on attitudes and perceptions about education.

This research also highlights differences in the characteristics of students based on post-high school plans. Cognizance of these differences may help school administrators provide programs appropriate to the needs of the entire student body, including those students who are at risk of dropping out. These results may also be used to show rural communities that the availability and quality of local employment opportunities have important implications for the performance of the students in the community.

These findings also suggest that a variety of local factors influence academic performance, which in turn impact the future productivity of the local labor force. The findings support the hypothesis that those students with the greatest ability, and who are the potential local leaders of the future, have a strong incentive to look elsewhere for employment if good jobs are not available locally. This tends to erode the potential future productivity of the local work force, which discourages high quality employers from moving into, or remaining in, these communities. Perhaps development efforts should pay increased attention to improving the local quality of life through improved public services. Such efforts could reduce the outflow of the more productive workers and best students, perhaps lure previous migrants back to the area, and improve the attractiveness of the community to potential new employers.

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[1]For a thorough discussion of the statistical analysis, see Bromhall and Johnson.

Human Capital, Transaction Costs and Farm Labor Supply and Demand: Some Implications for Rural Economic Development

Stephan J. Goetz*

Introduction

While total farm labor in U.S. agriculture is declining, hired regular and year-around labor is becoming relatively more important, as indicated by the number of hired workers and number of days worked annually.[1] The proportion of farm operators working off-the-farm remains high, suggesting that many farmers obtain higher returns to labor and skills from off-farm employment than on-the-farm, for at least part of the year. Some farmers may even find it profitable to employ hired workers to do chores during their absence.[2] This paper presents a framework for analyzing the joint determination of hours of labor hired and hours of labor supplied off-the-farm. Implications for rural economic development in the southern U.S. are also presented.

Farmers' decisions to work off-farm are commonly modeled independently of labor-hiring decisions. For example, Huffman and Lange (p.472) assume that family and hired labor differ "because of different entrepreneurial skills and incentives to work," and treat hired labor as purchased variable inputs. Sumner (p.500) states that "the decision to hire labor depends in part on the farm operator's time allocation." He uses hired labor wages rather than quantities of hired labor in his equation for net farm receipts. An exception is Findeis and Lass (and Findeis), who examine off-farm labor supply and hired labor use as joint decisions. However, they do not explicitly motivate their model using transaction costs, as is done here. Transaction costs are the costs involved in making an exchange. They include *ex ante* costs of linking two or more parties which could potentially benefit from the exchange, costs of making the actual exchange, and *ex post* costs, if any, of ensuring that all elements of the exchange have been carried out correctly.[3] When transaction costs exceed expected benefits of the exchange, the transaction fails to take place. This can be interpreted as a failure of the market to coordinate potentially beneficial economic activity (i.e., matching of suppliers and demanders of particular goods and services).

Additional information and greater estimation efficiency can be gained by modeling the hiring decision together with the off-farm work decision, using reduced-form labor supply and demand equations, if transaction costs in labor markets force some households into "corner" solutions and the decisions are made jointly. A key argument is that some farmers are unable to hire all the labor they need because of transaction costs and, conversely, not all farmers who desire off-farm employment can obtain it. As in the case of off-farm labor market participation, farmers must first decide whether or not to "participate" in the market for hired labor, and then how much labor to hire. Human capital is important in this analysis because it is hypothesized to reduce transaction costs facing decisionmakers by providing them with access to a wider range of information sources, while at the same time broadening the set of employment opportunities available to them. Human capital consists of formal education provided by schools, and specific experience gained by repeatedly carrying out the same set of activities over time.

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Transaction Costs and Selection Bias Issues

There is increasing recognition that individuals *select* themselves into alternative programs or "states", which can introduce estimation bias into regression parameters. An example of a program is the Conservation Reserve Program; an example of a farmer being in a certain "state" is the state of "hiring labor," or "working off-farm." A key statistical consideration is that the process by which individuals chose whether or not to participate in, or select themselves into, different programs and states is not a random one. Some individuals may have a strong aversion towards risk or possess special skills, for example, so that they are more likely to participate in a given program or state. Ignoring this systematic process can lead to biases in estimation. For example, Heckman demonstrated that wage earnings equations for women who had (non-randomly) selected themselves into a wage earning "state" were biased. Recent selection bias studies in agriculture include Tokle and Huffman; Vandeman et al.; Perloff; and Goetz (1992) in addition to that by Huffman and Lange.

While the sequential nature of the decision to work off-farm is well-recognized (*i.e.*, first, whether or not to participate and, second, for how many hours), this has generally not been the case for decisions related to hiring of labor. Yet in any given data sample, some households will be unable to acquire labor--they are rationed at a corner solution.[4] This is caused in part by the transaction costs of hiring labor.[5] These costs include both physical exchange costs, such as search, travel and communication, etc. and *ex ante* costs of ascertaining the quality of hired labor. While transaction costs for labor hiring are similar to those for farmers seeking off-farm employment, there are important differences. Part of the cost of hiring workers is the informational cost of learning about laws governing employer and laborer relations in agriculture. These laws are complex and subject to change over time. The costs associated with hiring labor were judged sufficient to warrant the development of computer software for facilitating compliance with laws affecting migrant labor (Alwang et al.).[6]

The explicit modeling of discrete and continuous decisions on both sides of the market, (*i.e.*, of participation in the off-farm sector and the market for hired labor on the one hand, and the amounts of labor transacted on the other), is especially important for rural areas. This is because transaction costs are higher in rural areas, as distances are greater and information gathering costs higher. Labor force participation rates tend to be lower in rural than in urban and suburban areas for these reasons, because there are comparatively more discouraged workers in rural areas (Preissing, Skees and Smith).[7] Discouraged workers no longer actively seek employment because they believe there are no jobs available for them. Further, if the same set of unobservable variables, including entrepreneurial skills and risk preferences, affect both the discrete decision of whether or not to hire labor and the continuous decision of how much labor to hire conditional on that decision, then regression estimates of equations modeling quantities of labor hired are biased. This is analogous to cases where the off-farm work equation is estimated without selection bias corrections.

A Farm Household Model

Sumner's model provides a starting point for the analysis. Suppose farmers maximize utility over leisure (t_l), consumption of goods g given exogenous prices and household characteristics affecting utility ($\boldsymbol{X}_u$):

$$U = U(t_l, g, \boldsymbol{X}_u). \tag{1}$$

The household faces an income constraint,

$$Y = y_f + y_m + y_x \tag{2}$$

where total income (Y) is the sum of farm earnings (y_f), off-farm income (y_m) and exogenous income (y_x). Total time available (T) is allocated among leisure (t_l), farm work (t_f), and off-farm work (t_m):

$$T = t_l + t_f + t_m \tag{3}$$

Equilibrium is achieved when the marginal value of time spent in the different activities is equal:[8]

$$w_u = w_f = w_m, \tag{4}$$

where the price of goods is the numeraire in terms of which the other quantities in the utility function are expressed,[9] so that:

$$w_u = \frac{\partial U/\partial t_i}{\partial U/\partial g} = w_u(t_i, g, X_u)$$

(Sumner, p.501); and

$$w_f = \frac{\partial \pi}{\partial t_f}$$

is the change in profits,

$$\pi = \pi(t_f, v, K, H_f)$$

which depend on time spent farming, prices of variable inputs and outputs (v), fixed inputs and outputs (K) and the farmer's human capital (H_f), with respect to changes in time spent working on the farm. The off-farm wage,

$$w_m = w_m(H_m, \Psi_m, \Omega)$$

depends on human capital (education and experience) associated with off-farm work (H_m), labor market conditions (Ψ_m), and other job characteristics (Ω).[10]

Profits from farming are assumed to rise at a diminishing rate as time spent farming increases (Figure 1). Off-farm income rises linearly at the off-farm wage rate, assuming the wage rate is constant regardless of the number of hours worked. Marginal returns from farming (w_f) and working off-farm (w_m) are equal at point A, which corresponds to an amount of time spent farming of $T(f)$. Beyond point A the farmer receives a higher marginal return from working off-farm than on-farm. If hired labor and family labor are perfectly substitutable, labor hiring can be shown to result from an indifference curve such as $U(a)$. A farmer with curve $U(a)$ forgoes income $dY(a)$ in exchange for additional leisure $T(f)-T(a)$ to maximize utility. A different farmer, with preferences $U(b)$, spends $T(b)-T(f)$ additional hours working off the farm in exchange for income $dY(b)$.

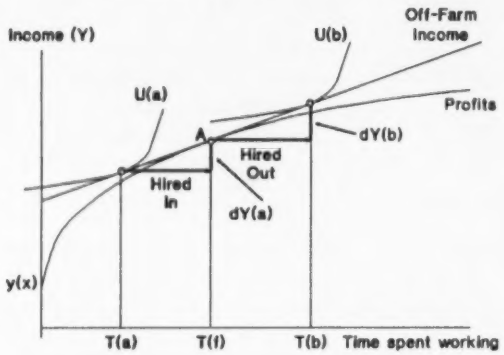

Figure 1. Farmers' Allocation of Time

Under certain conditions, farmers may simultaneously hire in labor and work off-farm themselves. More specifically, if a minimum amount of daily labor is necessary to maintain the farm [$T(min)$], then it can be more profitable for a farmer to work off-farm while hiring worker to do chores (Figure 2). The slope of the line labelled "wage bill" measures the wage farmers must pay hired workers. More specifically, if the off-farm wage exceeds the hiring wage, then it is possible for a farmer to achieve greater utility on curve $U(a)$ than on $U(b)$. Curves $U(a)$ and $U(b)$ now represent two different levels of utility for the same individual. This assumes the farm will shut-down if time spent working on it falls below $T(min)$, in which case profits from farming are zero. The farm operator will leave agriculture if the off-farm wage were so high as to preclude a tangency with the profits line (i.e., as the off-farm income line becomes steeper and steeper, the point of tangency moves from point B to C, where C is the shut-down point).

The assumption that family and hired labor are substitutable merits additional discussion. Many writers argue that family and hired labor are not of the same quality. However, it is important to distinguish two types of labor input. One is the *entrepreneurial* input, which

consists of decisions of how much to produce with which set of inputs; where to buy the inputs and when and where to sell the output. The other input is the *physical effort* involved in implementing the entrepreneurial decision. This includes feeding and watering livestock, plowing and seeding crops, and harvesting output such as corn or tobacco leaves. The former input was defined earlier as H_p, while the latter is captured in t_f.

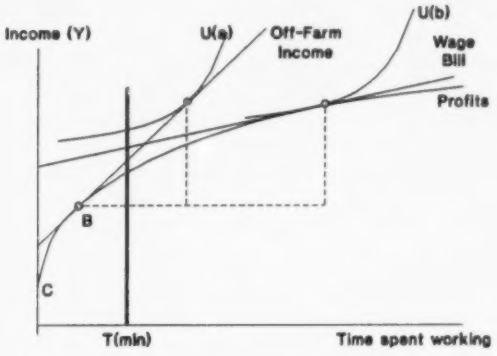

Figure 2. Farmers' Allocation of Time with Simultaneous In and Out Hiring

It can be argued that hired labor possesses the same *manual skills* as the farmer required to carry out farm chores. Thus, once the entrepreneurial decision has been made, the work itself can be completed as effectively by the hired worker as by the farmer. This may not always be the case, however. Some economists argue that hired workers do not have the same incentives as family workers, so that their marginal productivity diverges from that of family workers. Pollack emphasizes the reduction in labor supervision costs for families acting as firms (see also Barzel). Schmitt examines the divergence between incentives of hired workers and farmers as a principal-agent problem.[11] However, to the extent that farmers oversee their farm operation at least once per week, it will be possible to ensure that tasks are carried out correctly by hired workers.

This discussion applies mainly to labor arrangements on small- to medium-sized family farms in the southern U.S., and not necessarily to large commercial fruit-and-vegetable operations found in Florida and California. In fruit-and-vegetable operations, however, payments to workers could be based on the number of units harvested, for example, which would reduce shirking problems. Shirking occurs when a worker supplies less than the optimal effort needed to complete a task. It can arise when workers do not have the same incentives as their employer in carrying out a task. On smaller farms the cost of supervising one or two workers to detect shirking is relatively minor. For example, it is relatively inexpensive to monitor, on a weekly basis or with greater frequency, livestock feed and water utilization; fuel consumption; plow depth and seeding rates, and quantities harvested, and compare them with prior expectations. Vandeman et al. (p.682) maintain that farm proprietors are in a better position to supervise workers than commercial contractors who hire out workers because "of their greater knowledge of the productive process." The threat of job loss can then be administered if the hired laborer's effort is deemed inadequate.[12]

Research on the relation between firm size and wage rates suggests larger firms pay higher wages to attract higher-quality workers who require less supervision. This is because supervisory costs rise with firm size, as measured by the number of employees. Smaller firms may pay lower wages because supervision is easier.[13] The same argument applies to traditional "family" farms in the southeastern U.S., which are small enough to permit adequate and effective supervision. The key is that incentives have to be structured so that hired workers bear immediately the consequences of their actions, even if those do not materialize until a later point (for example, in the form of reduced yields at harvest).

An alternative to threat as an incentive is offered by Frank. He develops a "commitment model" which yields two possible solutions to shirking problems (p.238 and Appendix). One is reliance on workers' reputation. The other is to create (p.239) "a work environment that fosters closer personal ties between co-workers." As Frank points out, the latter approach has been

used successfully by Japanese firms. Perhaps more importantly, when repeated transactions occur between the same parties over a number of years, the cost to a worker of shirking rises considerably. This intertemporal dependency is, of course, ignored in the conventional shirking or principal-agent problems when they are analyzed in a static context.

Modeling Farm Labor Supply and Demand

The development of a unifying econometric model in this section is motivated by the importance both of off-farm work and labor hiring, and the possibility that some farmers are hiring workers so that they may work off-farm. Table 1 illustrates the importance of labor flows onto and from farms. Only about one-half of all U.S. farm operators did not have off-farm jobs in 1987. The proportion in Appalachia, the Delta States and Southern Plains is below the national average, with only about one-third of Appalachian farmers not having off-farm work. At the same time, a sizeable share of operators spent less than 250 days on farm work. A non-negligible share of hired farm workers spent more than 250 days on farmwork, and many reported doing *only* farm work. These numbers underscore the importance of labor flows onto and from farms, suggesting that in many cases the jobs involved are not trivial part-time employment, and that improved coordination of these flows could enhance rural economic well-being.

Table 1. Farm Labor Transactions, Various Regions, 1987

Labor Flow	U.S.	Appalachia	Southeast	Delta States	Southern Plains
Number of farm operators (in thousands)	2,753	367	149	136	245
Days of farmwork (%):					
Fewer than 25	11.3	17.4	10.1	9.6	13.0
25-249	31.0	34.9	37.6	33.8	42.5
250 and over	57.7	47.1	52.4	56.6	44.9
Did farmwork only (%)	51.5	37.1	53.0	43.4	44.1
Number of hired farmworkers (in thousands)	2463	267	186	138	222
Days of farmwork (%):					
Fewer than 25	34.8	51.3	22.0	29.0	45.5
25–249	46.6	38.2	60.8	49.3	42.8
250 and over	18.6	10.5	17.2	21.0	12.2
Did farmwork only (%):	52.8	53.2	65.1	58.7	51.8

Source: Calculated from Oliveira and Cox, Appendix tables 4 and 8.

Conceptual Framework

Kentucky Agricultural Census (1987) data show that of all farm operators working off-farm, over two-thirds did so for more than 200 days.[14] Survey data from a random sample of nearly 600 Kentucky farm households in 1986 reveal that 10.4% neither hired labor nor worked off-farm, 27.9% hired labor and had neither husband nor wife working off-farm, 19.9% had the husband and/or the wife working off-farm and did not hire labor, while 41.8% both hired labor and had one or both partners working off-farm.

Equilibrium condition (4), *i.e.*, the equality of marginal returns from leisure and on- and off-farm work, can be achieved when markets function without friction and farmers are not rationed into corner solutions. Here the four possible states discussed above for Kentucky farm survey data are modeled. It is assumed that family and hired labor are substitutable, and that farm wages equal the marginal value product of workers: $w_f = MP \cdot P_y$, where P_y is the price of farm output. The wage for hired labor, w_h, depends on labor market conditions (Ψ_h, which differ from Ψ_m, defined earlier), and t_m and t_h denote transaction costs incurred in finding off-farm work and obtaining hired labor, respectively, converted to an hourly basis and expressed as a proportion of the wage:[15]

a. $w_m/(1+t_m) \leq w_f \leq w_h(1+t_h)$:
no labor hiring, no off-farm work.

b. $w_m/(1+t_m) \leq w_f \geq w_h(1+t_h)$:
hire labor in only.

c. $w_m/(1+t_m) \geq w_f \leq w_h(1+t_h)$:
work off-farm only.

d. $w_m/(1+t_m) \geq w_f \geq w_h(1+t_h)$:
hire labor in plus work off-farm.

Transaction costs, due to distance and information gathering expenses, raise effective wages farmers pay for hired labor and reduce effective wages earned from off-farm work.[16] In Figure 3, transaction costs are seen to reduce the amount of time spent working off-farm by a farmer, while increasing time spent farming.[17] The costs reduce effective off-farm income from line w to that labelled $w/(1+t)$. A lower level of utility is reached in the presence of transaction costs than when these costs are zero: $U(t>0) < U(t=0)$. Conversely, a reduction in transaction costs both raises the amount of time a farmer spends working off-farm and increases farm labor hiring. In this manner, economic activity is stimulated in the rural area.

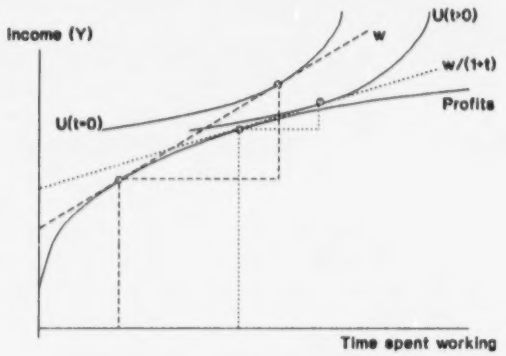

Figure 3. Effect of Transaction Costs on Farmers Working Off-the-Farm

Empirical Analysis

The empirical analysis proceeds as follows. First, estimate the probability that farm household j has selected itself into either of categories *a.* through *d.* using a bivariate probit structure. These probability equations model discrete (yes/no) participation decisions, incorporate fixed transaction costs as discussed below, and use predicted wages for households where no member works off-farm. This can be thought of as a dual dependent variable, which assumes the value (0,0) for households in category *a.*, *i.e.*, those that neither hire labor nor work off-farm; (0,1) for households in category *b.*; (1,0) for those in *c.*; and (1,1) for those in *d.*, *i.e.*, which hire labor and work off-farm. Second, from the bivariate probit estimates of parameters the ratio of the marginal to the cumulative probability that household j hires in labor or has a member working off-farm is calculated. This variable is

entered as a correction term into the equation determining amounts of labor to hire in or out (the continuous decision), as discussed below.

If vectors Z_{hj} (Z_{mj}) and t_{hj} (t_{mj}) represent predetermined factors and transaction costs affecting labor hiring (= *i* for "in") and (off-farm work (= *o* for "out")) decisions, respectively, the bivariate probit structure is:

$$(5a) \qquad i_j^* = \alpha_0 Z_{hj} + \alpha_1 t_{hj} + \nu_{hj}$$

where $i_j = 1$ *iff* $i_j^* > 0$, and 0 otherwise. This equation predicts the probability that a farmer hires in farm labor, as a function of predetermined factors and the transaction costs involved in hiring workers. It models only the discrete decision of whether or not to "switch" into the labor hiring state, and is not concerned with the number of hours of labor hired. An analagous equation is estimated for the probability that a farmer works off-farm (but not the number of hours worked):

$$(5b) \qquad o_j^* = \beta_0 Z_{mj} + \beta_1 t_{mj} + \nu_{mj}$$

where $o_j = 1$ *iff* $o_j^* > 0$, and 0 otherwise, and we assume $E(\nu_{hj}) = E(\nu_{mj}) = 0$; $var(\nu_{hj}) = var(\nu_{mj}) = 1$, and $cov(\nu_{hj}, \nu_{mj}) \equiv \rho$. Let $\varphi_j = Z_j \cup t_j$ for simplification. Then the bivariate normal cumulative density function maximized to obtain parameter estimates is:

$$\Phi^{bivar}(\varphi_1, \varphi_2, \rho) = \int_{-\infty}^{\varphi_1} \int_{-\infty}^{\varphi_1} \phi^{bivar}(k_1, k_2, \rho) dk_1 dk_2$$

where

$$\phi^{bivar}(\cdot) = \frac{e^{-1/2(\varphi_1^2 + \varphi_2^2 - 2\rho\varphi_1\varphi_2)/(1-\rho^2)}}{2\pi\sqrt{1-\rho^2}}$$

This simply extends the univariate probit case-for either the labor hiring or off-farm work decision alone-to allow for the fact that these decisions may be made interdependently. The degree of interdependence is measured by parameter ρ, the covariance between the error terms in eqns. (5*a*) and (5*b*).

Testable hypotheses are that $\alpha_1 < 0$ and $\beta_1 < 0$. If so, higher transaction costs reduce the *probability* of labor flows onto and from farms. Conversely, policies which reduces transaction costs improve labor supply and demand matching, thereby contributing to economic development in the rural area.

Equations for hours of labor hired in (r_h) and hours worked off-farm (r_m) are then estimated. For hiring households the equation is:

$$(6a) \qquad r_{hj} = \alpha_2 Z_{hj} + \epsilon_{hj}$$

The number of hours of labor hired is hypothesized to depend on predetermined factors summarized in Z_{hj}, which was also used in eqn. (5*a*). The discrete participation and continuous hiring decisions do not necessarily depend on the same variables. In other words, some variables may affect the participation but not the continuous decision and *vice versa*. To keep the notation manageable, we assume that transaction costs affecting the continuous decisions of how much labor to supply and demand are already included in Z_{hj} and Z_{mj}. For household hiring labor, $r_{hj} > 0$, while $r_{hj} = 0$ for those not hiring labor. For the former group we know from eqn. (5*a*) that $i_j = 1$, which is the same as:

$$(\alpha_0 Z_{hj} + \alpha_1 t_{hj}) > -\nu_{hj}$$

These households have a stronger desire or propensity, and possibly lower transaction costs, to overcome barriers to labor hiring. An analagous structure exists for households working off-farm:

$$(6b) \qquad r_{mj} = \beta_2 Z_{mj} + \epsilon_{mj}$$

where $r_{mj} > 0$ for households with one or more members working off the farm. These households meet the condition from eqn. (5*b*) that:

$$(\beta_0 Z_{mj} + \beta_1 t_{mj}) > -\nu_{mj}.$$

That is, these households have a strong propensity to be switched into an off-farm work "state." Because of the systematic supplemental conditions associated with each of the eqns. (6*a*) and

(6*b*), direct estimation without any correction yields biased coefficient estimates. The reason is that the expected value of the error terms in eqns. (6*a*) and (6*b*) is not zero if the continuous decisions are interdependent with the discrete decisions:

$$(7a) \quad E(\epsilon_{hj} | \alpha_0 Z_{hj} + \alpha_1 t_{hj} > -\nu_{hj}) \neq 0 \quad \text{and}$$

$$(7b) \quad E(\epsilon_{mj} | \beta_0 Z_{mj} + \beta_1 t_{mj} > -\nu_{mj}) \neq 0.$$

This interdependency will be significant if the discrete and continuous decisions are affected by the same unobserved variables, such as willingness to bear risk or interpersonal communication skills. The conditional expectations (7*a*) and (7*b*) can be shown to equal (see Johnson and Kotz; also Heckman and Maddala):

$$(8a) \quad \hat{\gamma}_{hj} \equiv -\sigma_{\epsilon h} \frac{\partial \Phi f(\hat{\varphi}_h)/\partial \hat{\varphi}_h}{\Phi f(\varphi_h)}$$

$$(8b) \quad \hat{\gamma}_{mj} \equiv -\sigma_{\epsilon m} \frac{\partial \Phi f(\hat{\varphi}_m)/\partial \hat{\varphi}_m}{\Phi f(\varphi_m)}$$

where Φ_j denotes the standard cumulative normal distribution evaluated at predicted values of φ_j, and $\sigma_{\epsilon h}$ and $\sigma_{\epsilon m}$ are the covariances $cov(\nu_h, \epsilon_h)$ and $cov(\nu_m, \epsilon_m)$. The terms represent the ratios of the marginal to the cumulative probability of a household being in the labor hiring and off-farm work states, respectively. Unbiased hours equations can be estimated by including the correction terms in equations (6*a*) and (6*b*).[18]

If the selectivity term in the equation for hiring is positive [negative] and significant, this suggests that a hiring household hires more [less] labor than a randomly selected household. Households with a positive term presumably have a comparative advantage over other households in terms of surmounting unobservable transaction barriers to labor hiring, and/or they may have different risk preferences. The interpretation is analogous for off-farm work equations.

This analysis has been limited to labor hiring and off-farm work decisions of the "average" farm household member. Many extensions are possible, including a distinction of off-farm work decisions by different household members (Findeis and Hall), seasonal vs. year-round agricultural labor hiring (Findeis), custom hiring activities along with custom work performed for others, and the hiring of different types of workers (differentiated, for example, by skill requirements).[19] If farmers select themselves into these different "states" in a non-random fashion, *i.e.*, if there is a systematic, endogenous process which "explains" the selection into the states, then it will be necessary to correct for resulting selection biases using the methods discussed above. Unfortunately, both the data requirements and the time required to solve multiple integrals in multivariate probit models rise significantly with these extensions. At present, it is probably not feasible to model this problem for situations involving more than a trivariate probit model (involving triple integrals).

Implications for Rural Economic Development

One interpretation of "economic development" is an improvement in the *articulation* or matching of the supply and demand for goods and services. The reduction of trading barriers brought about by moving from a barter- to a cash-based economy improves the ability of markets to perform their coordinating function. Removal of other barriers to exchange, for example, by building modern highways through rural areas or installing telecommunication facilities is often held up as stimulating development. Yet there are other, poorly understood and less visible barriers to exchange. As Coase (p.715) points out in accepting the 1991 Economics Nobel Prize, there are "... costs of using the pricing mechanism. What the prices are have to be discovered. There are negotiations to be undertaken, contracts have to be drawn up, inspections have to be made, arrangements have to be made to settle disputes, and so on." He also contends that (p.716), "... a large part of what we think of as economic activity is designed to accomplish what high transaction costs would otherwise prevent or to reduce transaction costs so that individuals can freely negotiate ...".

This paper attempts to reconcile the failure of markets to solve farm labor availability problems and the persistent unemployment problem in urban and many rural areas. For some farmers, one or two months of tight labor supplies may preclude off-farm employment. Seasonal and year-round farm employment may provide opportunities for discouraged workers in urban and rural areas. However, to the extent that the farm work is only seasonal, and if re-application to certain welfare programs requires a 2-month or longer waiting period after the seasonal work has been completed, discouraged and unemployed workers are less likely to switch readily between employment and unemployment states. Consequently, institutional barriers exist to improved articulation of labor supply and demand; there is insufficient flexibility in these programs to permit a better utilization of the unemployed work force.[20]

It is argued that improved matching of this demand for and supply of labor enhances rural well-being. Increases in labor utilization both on- and off-farm brought about by reduced transaction costs are shown as shaded areas in Figures 4 and 5. Corresponding to these is, of course, an increase in rural non-farm output, representing a general increase in economic activity.

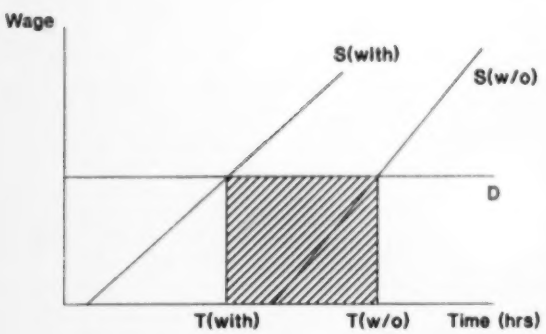

Figure 4. Off-Farm Supply of Farm Labor with and without Transaction Costs

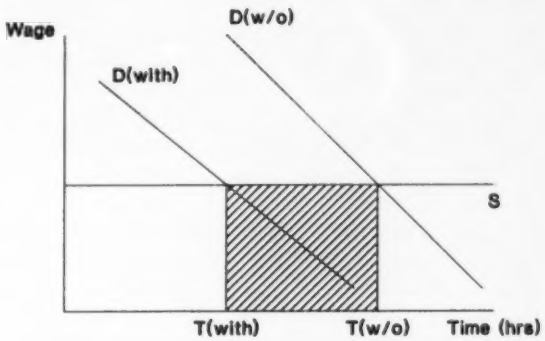

Figure 5. Demand by Farmers for Hired Labor with and without Transaction Costs

In studies where data are available, the number of pre-school children and the distance to major economic centers tend to negatively affect off-farm labor market participation rates. To some extent this may reflect limited availability of day care in rural communities. Another variable often associated with a higher probability of off-farm employment is years of formal education. While part of this result may be explained by the signalling value of a diploma to an employer, education may also reduce transaction costs associated with finding employment, since the more-educated are likely to have access to a wider range of information sources about job opportunities.[21]

Rural information clearing offices for farm employers and employees could reduce transaction costs. If telecommunications facilities become increasingly available to rural residents, the importance of distance and lack of child care facilities as barriers to participation may decline over time (*i.e.*, work can be carried out in the home), although face-to-face contact is usually required at some point during employment interviews. Simplification of agricultural employment laws and increased extension programming designed to make laws more understandable to farmers will reduce transaction costs for farmers hiring laborers.

Farm labor contracts could be designed to encourage repeated exchange between the same farmers and hired workers, which would elimi-

nate annually recurring fixed transaction costs of labor hiring and further reduce shirking problems. The latter will also be achieved if hired workers' employment prospects in subsequent years depend on the family farm's performance in the current year.

A policy option designed to reduce transaction costs for farmers and for workers traveling to, from and within rural areas to obtain employment would be to permit tax deductions for travel expenses. Public transportation in major metropolitan cities is often subsidized for urban employees and their employers. While the federal tax code subsidizes longer-term mobility by allowing the deduction of moving expenses under certain conditions, the same is not true for day-to-day costs of traveling to job sites. Costs to the treasury of allowing such deductions must be balanced against benefits of higher payroll taxes and economic activity.

Summary and Conclusion

The paper examines labor hiring and off-farm work decisions of farm households as joint decisions. It is motivated empirically by the fact that while the total agricultural labor force is shrinking, hired labor is becoming relatively more important, and a sizeable portion of farmers work off-farm. A further consideration is that not all farmers who wish to are able to find off-farm employment or hire all the worker they need. A distinction is made between the discrete and possibly joint decisions of whether or not to hire labor and/or work off-farm, and the continuous decisions regarding amounts of labor to hire and supply off-farm. Human capital is argued to play an important role in reducing transaction costs involved with the labor hiring and off-farm work decisions.

Labor market transaction costs prevent some farmers from working off-farm, while also preventing some from hiring all the labor they need. If farmers select themselves into different off-farm work and hiring "states" in a deliberate, non-random fashion (for example, in accordance with their skills, risk preferences and other unobserved factors), then ordinary regression parameters from a labor hiring and hours worked equation will be biased. A method to correct for this selection bias was discussed.

This paper also suggested that a reduction in transaction costs facing farmers both as on-farm employers and off-farm employees could contribute to greater economic activity in many rural areas of the southern U.S. A starting point for research may lie in systematically collecting data on and analyzing alternative institutional arrangements for hiring labor that are already in existence (Polopolus and Emerson; Leffler and Rucker; Coase), on both large commercial and smaller "family" farms. It is hoped that future research will identify in more detail the principal sources of transaction costs. Once those sources have been ascertained, creative methods for reducing the costs could be implemented. It would also be useful to identify the personal characteristics of farmers-such as a tendency toward entrepreneurship-that make them more likely to participate in certain programs and states.

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Endnotes

1. In 1980, 438 farm workers were hired per 1,000 farm population. By 1987, that number had risen to 494 (compiled from Oliveira and Cox; and LeClere and Dahmann). The number of workers working 250 days or more per year increased from a low of 285,000 in 1971 to 458,000 in 1987.

2. The book edited by Hallberg et al. contains papers presented at a 1988 symposium on multiple jobholding of farmers.

3. Further discussion can be found in Hirschleifer.

4. These households face a binding non-negativity constraint (see also Huffman and Lange, who discuss this issue in the context of joint decision making of husbands and wives with respect to off-farm work; and Wales and Woodland).

5. This paper does not address institutional innovations that arise in response to transaction costs. An early reference in this regard is the seminal work of Cheung on sharecropping. For a recent analysis of timber harvest contracts, see Leffler and Rucker. Polopolus and Emerson and Vandeman et al. examine contractual choices of agricultural labor-hiring firms in Florida and California.

6. The program is "MILAW," (Migrant Labor Law). Kentucky lawmakers at the time of this writing are considering legislation designed to make it easier for farmers to find workers and help farmers fill out forms required to employ laborers.

7. Increasingly, however, discouraged worker rates in core urban areas with high unemployment appear to be rising.

8. This also follows from the work of Becker. See Singh et al. for extensions.

9. The utility function includes quantities measured in different units (time, units of goods and demographic variables such as the number of young children). By expressing the value of a marginal unit of utility in terms of the price of goods, it is essentially possible to compare the marginal returns from the different activities, including farm and off-farm work as well as the consumption of goods.

10. We do not distinguish between decisions made by husbands and wives (and for that matter, offspring). Instead we assume an average wage which depends on personal characteristics of each partner, weighted by the number of hours worked off-farm.

11. I am grateful to L. Lueschen and M. Ahearn for drawing my attention to this paper. In the principal-agent problem the farmer (a principal) faces the challenge of remunerating the farm worker (the agent acting on behalf of the principal) in a way that forces the agent to behave in a manner that is consistent with maximizing the farmer's objective function.

12. The same argument is made in the context of labor hiring in land-abundant tropical agriculture in Goetz (1993). In those conditions the employer often works in the field at the same time as the hired laborer(s), and is able to directly monitor performance.

13. Kraybill et al. report empirical results based on a survey of workers in various industries in rural Georgia which support the wage-firm size hypothesis. See their paper for references to this literature.

14. A school year lasts 185 days, so these individuals were not merely driving school buses.

15. A further refinement would be to distinguish between fixed and variable transaction costs. A proportional cost is assumed here to facilitate the exposition.

16. It is, of course, possible to accommodate differences in preferences for off-farm work among those who grew up on a farm and those who did not. For the present we ignore institutional rigidities requiring farmers to work a minimum number of hours in off-farm jobs.

17. Schmitt examines transaction costs in the context of arranging contracts with and/or monitoring hired labor; he does not consider transaction costs facing farmers who seek off-farm employment.

18. It is also necessary to correct for heteroscedasticity, and to take into account the fact that the selectivity terms were estimated in the first stage regression. See Maddala for a discussion.

19. Findeis and Lass also discuss effects of the sectoral composition of the rural economy.

20. There is a vast literature on participation in and incentives related to the welfare in the U.S. See Moffitt for a recent review.

21. A study by Christopher Hurt and Howard Doster at Purdue University reports that more-educated farmers receive higher average output prices, in part because they are better able to take advantage of alternative "business techniques" (see SRDC).

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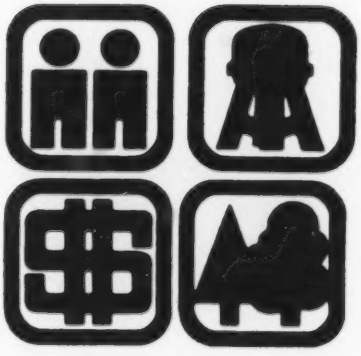

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